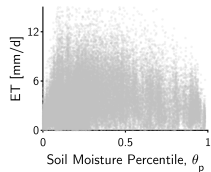


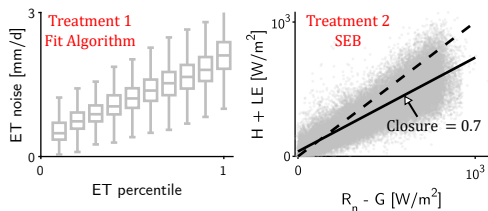
## Step 1. Control Eddy Covariance Data Uncertainty

### a) Baseline Filtering for All Assumptions



LE, H, R<sub>n</sub>, GPP > 0  
T<sub>a</sub> > 5°C  
VPD<sub>a</sub> > 0.5kPa  
RH < 95%  
Remove 48 hrs after rain  
Observed or HQ gapfill

### b) Noise and Bias



## Step 2. Specify Model to Infer Stress

### d) PMOC Model Structure

$$G_c = f(\text{VPD}, \text{GPP}, C_a; \mathcal{P}) \quad (\text{Eqn. 1 or 2})$$

$$\text{ET} = f(G_c, \text{VPD}_a, R_n, G_a, T_a, P_a) \quad (\text{Eqn. 3})$$

### e) Fit Parameters to Data

$$\mathcal{P} = (G_o, G_1, m)^T$$

minimize  $\mathcal{F}(\mathcal{Y}_{\text{mdl}}(\mathcal{P}) - \mathcal{Y}_{\text{obs}})$

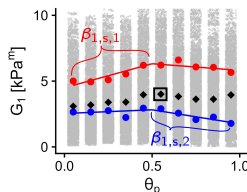
subject to  $\mathcal{P} \in \Omega_{\mathcal{P}}$

## Step 3. Extract Dominant Stress Signals and Performance from 2,304 Assumption Sets (AS)

### f) Soil Water Stress

$$G_1 = \beta_{o,s,i} + \beta_{1,s,i} \cdot \theta_p$$

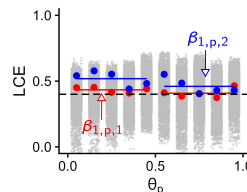
Acceptable:  $|\beta_{1,s,i}| \geq 0.4$



### g) Predictive Performance

$$\beta_{o,p,i} = \overline{\text{LCE}}$$

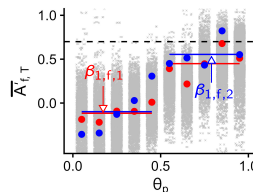
Acceptable:  $\beta_{o,p,i} \geq 0.4$



### h) Functional Performance

$$\beta_{o,f,i} = \overline{\Lambda_{i,T}}$$

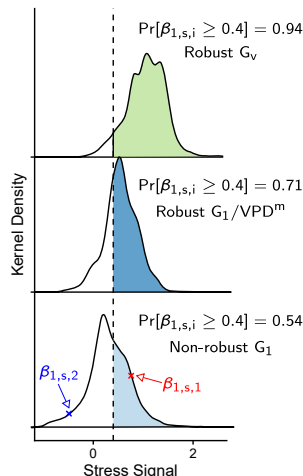
Acceptable:  $\beta_{o,f,i} \geq 0.7$



## Step 4. Apply Robust Soil Water Stress Framework

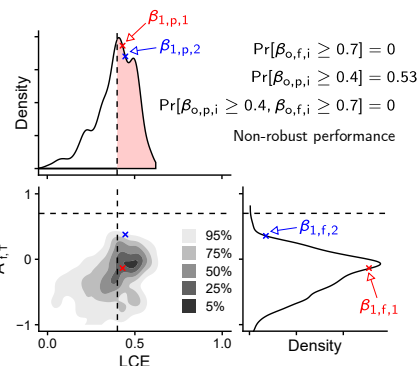
### i) Robust Stress (o) Criteria

70% of AS exceeding practical slope threshold for at least 2 of 3 ecosystem parameters



### j) Robust Performance (+) Criteria

70% of AS jointly exceeding predictive and functional performance thresholds



Stress: 2 out of 3 Robust  
Performance: Non-robust  
Robustness Class: Robust Stress (o)